

Debugging and Programming Mega 2560

This document contains the entire interaction and steps for debugging and programming the ATmega2560 microcontroller on the Tenstar Robot Mega 2560 board.

Setting Up Homebrew and Tools

1. Installed Homebrew:

Ran the command:

```
/bin/bash -c "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/HEAD/install.sh)"
```

○

Checked installation with:

```
brew --version
```

○

2. Installed **avrdude**:

Ran:

```
brew install avrdude
```

○

Verified the version:

```
avrdude -v
```

○

Connecting the Board

Checked available ports:

```
ls /dev/tty.*
```

Example output:

```
/dev/tty.Bluetooth-Incoming-Port
```

```
/dev/tty.usbmodem00001
```

1.

Verified connection to the board by specifying the correct port. In this case:

```
/dev/tty.usbserial-110
```

2.

Adjusted permissions for the port:

```
sudo chmod 666 /dev/tty.usbserial-110
```

3.

Reading Firmware from the Board

Used **avrdude** to read the existing firmware:

```
avrdude -p m2560 -c wiring -P /dev/tty.usbserial-110 -b 115200 -U  
flash:r:jade_mega_firmware.hex:i
```

1.

Verified the file was created:

```
ls -lh jade_mega_firmware.hex
```

2.

Writing Firmware to the Board

1. Moved the firmware file to the correct directory, e.g., **Documents**.

Command to flash the firmware:

```
sudo avrdude -p m2560 -c wiring -P /dev/tty.usbserial-110 -b 115200 -U  
flash:w:/Users/dima/Documents/jade_mega_firmware.hex:i
```

2.

3. If the **chip erase failed** error occurred, tried the following:

Specified the `-D` flag to disable chip erase:

```
sudo avrdude -p m2560 -c wiring -P /dev/tty.usbserial-110 -b 115200 -U  
flash:w:/Users/dima/Documents/jade_mega_firmware.hex:i -D
```

○

Adjusted the delay with the `-x delay=100` option:

```
sudo avrdude -p m2560 -c wiring -P /dev/tty.usbserial-110 -b 115200 -U  
flash:w:/Users/dima/Documents/jade_mega_firmware.hex:i -x delay=100
```

○

Verified the flashing process:

```
Writing | ##### | 100%  
Reading | ##### | 100%  
261406 bytes of flash verified
```

4.

Troubleshooting Steps

Checked Connection: Used:

```
avrdude -p m2560 -c wiring -P /dev/tty.usbserial-110 -b 115200 -v
```

Confirmed the device signature:

Device signature = 1E 98 01 (ATmega2560)

●

Adjusted Port Settings: Re-ran:

```
sudo chmod 666 /dev/tty.usbserial-110
```

●

Changed Baud Rate: Tried a lower baud rate of `57600`:

```
sudo avrdude -p m2560 -c wiring -P /dev/tty.usbserial-110 -b 57600 -U  
flash:w:/Users/dima/Documents/jade_mega_firmware.hex:i
```

●

Editing Firmware

1. Extracting/Analyzing the Firmware:

- Hex files cannot be directly edited.
- Options include:
 - Decompiling the firmware with tools like Ghidra or IDA Pro.
 - Editing directly using a hex editor (HxD, Hex Fiend).

2. Working with the Source Code:

- Locate the original `.ino` or C++ files (if available).
- Make changes and recompile using:
 - Arduino IDE.
 - PlatformIO.
 - Command-line tools (`avr-gcc`).

This log provides a complete guide to programming the ATmega2560 board, debugging errors, and troubleshooting connectivity issues.